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Sent Via Facsimile

Number of Pages: 14 including cover sheet

TO: Toan M. Le, EXAMINER
Company: US Patent and Trade Office
Fax Number: 703/872-9318

CC:
Fax:

From: Sofia McGuire

Fax Number: 713/521-2873
Tel. Number: 713/552-2727

Date: 9/20/02 10:04:35 AM

RE: Application No. 09/853,190

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REMARKS:

Please see attached with changes based upon the Office Action Summary. This is the same correspondence as faxed on Sept 18 - the Transmittal Form has been added in this correspondence. A hard copy is being mailed today to the Commissioner for Patents, with Transmittal Form added. If you have any questions concerning this transmission or the application, please contact me directly at 713/942-7926.

Thank you.

Sincerely, Sofia McGuire

Confidentiality Notice:

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SENT VIA FACSIMILE 703/872-9318

September 18, 2002

Toan M. Le, Examiner
Box PATENT APPLICATION
Commissioner for Patents
Washington, DC 20231

RE: Application No. 09/853,190
Applicant Tawassul A. Khan (Inventor)
Titled - Mapping Permeable Reservoir Formations by Measuring the
Elastic Nonlinear Interactions of a Seismic Wave as it Propagates
through the Reservoir Rock Matrix and its Pore Fluids.

Dear Mr. Le:

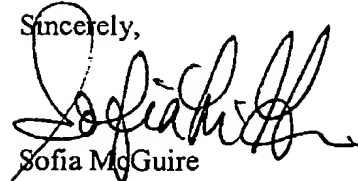
Enclosed is the Reply to USPTO Office Action Summary of July 31, 2002 regarding Application No. 09/853,190.

The write-up has been submitted for the intent of making the patent clearer and the claims have been rewritten and modified to be more specific and to remove any ambiguity of these claims by taking out any 'general' terms. Please reconsider the revised claims; we believe we have reduced any uncertainty due to the generic nature of our previously written claims.

Further, we are resubmitting and rewriting the original claim 9 for consideration. This election to resubmit all 9 claims supersedes the provisional election made by Sofia McGuire on July 23, 2002.

Thank you for your consideration in this matter. Please do not hesitate to contact me at 713/942-7926 with any questions.

Sincerely,


Sofia McGuire

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REPLY TO USPTO OFFICE ACTION SUMMARY OF JULY 31, 2002,
RE: APPLICATION NO. 09/853,190

Election/Restrictions

5

The applicant resubmits the original claim 9 for consideration as a species of the claim that is being submitted. The original claims 1-9 are clarified as follows in italics:

10 *A new method for determining in-situ bulk tortuosity of the interconnected pores of reservoir rock, and estimating the bulk permeability of a reservoir formation between seismic transmitters and seismic receivers, such method comprising 1-7 below:*

- 15 1. *Transmit a monofrequency signal generated by a seismic transmitter or seismic transmitters and received by a seismic receiver or seismic receivers.*
2. *Analyze the spectral content of the received signal.*
3. *Identify the side lobes of the monofrequency signal that was transmitted.*
- 20 4. *The frequency of the side lobes represents $(F - F_{drag})$ and $(F + F_{drag})$ where F is the monofrequency and F_{drag} is the frequency of the 'Drag Wave'. These side lobes are generated due to the elastic nonlinear interaction between the monofrequency wave traveling through the rock matrix and the 'Drag Wave' being generated due to the coupling between the matrix and pore fluids.*
- 25 5. *Calculate the velocity of the 'Drag Wave' V_{drag} by using the Doppler Effect in which $F_{drag}/F = V_{drag}/(V - V_{drag})$; where F_{drag} is the frequency of the 'Drag Wave' (see 4 above), F is the monofrequency, V_{drag} is the velocity of the 'Drag Wave' and V is the velocity of the monofrequency signal.*
- 30 6. *The bulk tortuosity of the inter-well reservoir rock formation can be estimated by: $V_{drag} = V_{fluid}/\sqrt{T}$, where V_{drag} is the velocity of the 'Drag Wave', T is tortuosity, and V_{fluid} is the compressional velocity of the pore fluids.*
- 35 7. *Once bulk tortuosity has been estimated, bulk permeability can be estimated using Scheidegger's equation $K = \phi r^2 / 8T$ or other equations generated by Kelder or Peeters.*
- 40 8. *The method of claims 1-7 specifically used to determine in-situ bulk tortuosity of the interconnected pores of reservoir rock, and estimating the bulk permeability of a reservoir formation connected between two wells.*
- 45 9. *The method of claims 1-7 specifically used to determine in-situ bulk tortuosity of the interconnected pores of reservoir rock, and estimating the bulk permeability of a reservoir formation in a well between two depth points in that well.*

PTO/SB/21 (08-00)

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/853,190	
	Filing Date	5-11-01	
	First Named Inventor	Tawassul A. Khan	
	Group Art Unit	2862	
	Examiner Name	Toan M. Le	
Total Number of Pages in This Submission	13	Attorney Docket Number	

ENCLOSURES (check all that apply)		
<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Assignment Papers (for an Application)	<input type="checkbox"/> After Allowance Communication to Group
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input checked="" type="checkbox"/> Amendment / Reply	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
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<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> Request for Refund	Response to Office Action Summary
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Response to Missing Parts/Incomplete Application	Remarks	
<input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53		

Please read enclosed letter

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Sofia McGuire, Vice President, Nonlinear Seismic Imaging, Inc.
Signature	<i>Sofia McGuire</i>
Date	9-20-02

CERTIFICATE OF MAILING		
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on this date: 9-20-02		
Typed or printed name	Sofia K. McGuire	
Signature	<i>Sofia McGuire</i>	Date 9-20-02

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